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## Los Alamos National Laboratory

Risk Reduction and Environmental Stewardship Division

Meteorology and Air Quality Group  
(RRES-MAQ)

## Quality Assurance Project Plan

for the

## Neighborhood Environmental Watch Network (NEWNET)

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## General Information about this plan

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### Appendices

This plan has the following appendices:

Number	Appendix Title	No. of pages
A	NEWNET Project Organization	1
B	NEWNET Station Locations	1
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## General Information, continued

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### History of revision

This table lists the revision history of this plan.

Revision	Date	Description Of Changes
0	5/25/01	New document.
1	11/3/04	Purpose of program revised to reflect educational driver.

## Section 1

# Quality Program

## Organization

<b>Background</b>	NEWNET serves as a prototype public outreach program to provide gamma radiation measurements, meteorological data, and tutorial information to the public. It is operated in cooperation with the Accord Pueblos (Cochiti Pueblo, Jemez Pueblo, Santa Clara Pueblo, and San Ildefonso Pueblo) to monitor selected locations near Los Alamos National Laboratory (LANL) and to provide training in the tools and techniques used to fulfill the requirements of DOE Order 5400.5 and the guidance of DOE/EH-0173T.
<b>What is NEWNET?</b>	NEWNET is a network of ambient monitoring stations having gamma radiation measurement and meteorological sensors. Each station is connected to a database. Data are available to the public via an Internet Web site ( <a href="http://newnet.lanl.gov">http://newnet.lanl.gov</a> ).
<b>What is monitored?</b>	The NEWNET system is intended to provide real-time data on radiation and contamination levels at selected locations near LANL. NEWNET stations may also monitor relevant environmental conditions such as the ambient temperature.
<b>Purpose of this plan</b>	This QA project plan describes the policies and requirements that ensure NEWNET data are collected, analyzed, and reported in a consistent, agreed-upon manner.
<b>Structure of the quality program</b>	<p>This QA Project Plan, including implementing procedures, is a second-tier document to the MAQ Quality Management Plan (MAQ-QMP). The following documents provide requirements to ensure that the NEWNET system is operated in accordance with the requirements described in the chapter <i>Quality Objectives and Criteria for Measurement Data</i>:</p> <ul style="list-style-type: none"><li>• MAQ Quality Management Plan</li><li>• QA Project Plan for NEWNET (this document)</li><li>• implementing procedures</li></ul>

## Organization, continued

<b>Group organization</b>	The Meteorology and Air Quality Group (MAQ) of the RRES Division is responsible for the NEWNET system at Los Alamos National Laboratory (LANL). See the Group MAQ Quality Management Plan (MAQ-QMP) for a description of the group organization, level of authorities, and lines of communication. The group is organized by project teams under the line management direction of the group leader. Project teams are cross-functional and focus on specific LANL air quality responsibilities, deliverables, or products. Project teams are guided by team leaders who have the responsibility to assure the project is completed.
<b>Project organization</b>	The MAQ Community Monitoring Project Leader manages the operation of the NEWNET. The project leader reports to the MAQ Group Leader. A group QA specialist is assigned to work for the project leaders to provide quality assurance assistance, advice, and review. Other group members work for the project leader to collect data, process collected data, maintain stations, manage databases, and provide data evaluation. In addition, representatives from other groups may participate and contribute to this team.
<b>Other supporting organizations</b>	Support for NEWNET is provided by employees and students of the Accord Pueblos (Cochiti Pueblo, Jemez Pueblo, Santa Clara Pueblo, and San Ildefonso Pueblo).
<b>Station managers</b>	For each off-site station, a member of the community will be invited to assist in managing and operating the NEWNET station. The station managers will be provided training on the operation and maintenance of the station and should take the lead in identifying and repairing station equipment.
<b>Applicable regulatory quality criteria</b>	Applicable quality criteria include the LANL "Institutional Quality Management" (LPR 308-00-00) and the DOE "Environmental Regulatory Guide" (DOE/EH-0173T).
<b>Other monitoring requests</b>	MAQ may be asked by the Laboratory management or other outside organizations to provide NEWNET stations for various purposes. As equipment supply and funding allows, these requests will be considered.

## ***Section 2***

### **Personnel Development**

#### **Personnel Training and Qualification**

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**Required  
personnel  
education**

Documentation of education qualification is maintained by the LANL personnel division. The NEUNET project requires personnel with the following skills:

- electronics or instrumentation technicians to perform system construction, calibration, and maintenance
  - health physicists to evaluate measurements and instrumentation
  - database programmers to maintain the database and the web site
- 

**Training of  
personnel**

All personnel performing NEUNET-related work are required to obtain appropriate training prior to performing work governed by a procedure. Training for all NEUNET personnel will be performed and documented according to the MAQ procedures for training (MAQ-024) and orienting new employees (MAQ-032).

## ***Section 3***

### **Quality Improvement**

#### **Improving Quality**

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**Performance  
reports**

Personnel assigned by the Community Monitoring Project Leader to perform activities provide periodic updates, either verbal or written, to the Community Monitoring Project Leader. These updates are used by the project leader to determine areas that require attention.

The project leader provides periodic updates, either verbal or written, to the group leader. These updates are used to keep group management apprised of the focus of the NEWNET activities and to identify any shortcomings that may be identified.

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**Corrective  
actions within  
MAQ**

Corrective actions for all MAQ projects are initiated, tracked, corrected, and documented according to the MAQ Quality Management Plan and group procedure MAQ-026, "Deficiency Tracking and Reporting."

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**Reports from  
station  
managers or  
community  
members**

When recommendations or reports of problems are received from community members or station managers, the Community Monitoring Project Leader will oversee and track the implementation of appropriate fixes or, for violations of requirements, initiate a deficiency report in accordance with MAQ-026.

## ***Section 4***

### **Documents and Records**

#### **Project Documents and Records**

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**Revising this plan**

This plan will be controlled through the MAQ document control program (MAQ-030, "Document Distribution"). The project leaders, at least one reviewer, and the group leader will approve all revisions to this plan.

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**List of document recipients**

This document will be controlled under the organization's document control system (MAQ-030, "Document Distribution"). Those who will receive or have nearby access to a controlled copy include:

- MAQ Group Leader
  - MAQ QA Officer
  - MAQ Community Monitoring Project Leader
  - MAQ NEWNET system staff members
  - MAQ NEWNET system technicians
  - Assistant Area Manager, Office of Environment and Projects, DOE Los Alamos Area Office
- 

**Procedures**

Procedures will be developed as necessary and in accordance with the policy in the MAQ QMP.



## Project Records

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### **Records resulting from the NEWNET project**

The number, type, and detail of all records to be kept will provide sufficient information to allow an individual with equivalent education and training to verify or reconstruct the methods used to collect and verify the data collected. Implementing procedures specify the records or other information to be kept as documentation of the performance of the procedure.

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### **Electronic records**

The project maintains electronic databases of the data collected at each NEWNET station. The programs and servers used to collect these data are maintained in accordance with group requirements for software and data management (see MAQ-QMP).

## ***Section 5***

### **Work Processes**

#### **Planning and Performing Work**

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**Policy**

Work that contributes to achieving the quality specifications of NEWNET project deliverables will be planned and documented in this plan and appropriate implementing procedures (see MAQ-QMP, section 5). Work will be performed according to plans and procedures. The Community Monitoring Project leader will provide first line supervision of personnel assigned to project tasks to ensure work is performed to achieve project quality specifications. Before changing a work process that affects the project quality specifications, the project leader will ensure the same level of planning and review as used in the initial project planning steps.

## Quality Objectives and Criteria for Measurement Data

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### What are DQOs?

Data quality objectives (DQOs) are statements of the uncertainty level a decision-maker is willing to accept in results derived from environmental data. DQOs must strike a balance between time, money, and data quality.

The DQOs are then used to develop a scientific and resource-effective data collection design. NEWNET system operations presented in this document reflect these requirements.

### Spatial Boundary of the Study

The spatial boundaries of interest for the NEWNET system include the region surrounding LANL and monitored by the NEWNET stations, as requested by other organizations.

### Temporal Boundary of the Study

Monitoring of external penetrating radiation by the NEWNET system was conducted from March 1997 until September 2002 as part of a Consent Decree, and continues with the support of the Accord Pueblos (Cochiti Pueblo, Jemez Pueblo, Santa Clara Pueblo, and San Ildefonso Pueblo).

### Practical Constraints on Data Collection

- Funding levels
- Equipment capabilities
- Damage to stations due to animals, people, or weather

## Quality Objectives and Criteria for Measurement Data, continued

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**Measurements to be made** Measurements are provided at some stations of the following parameters:

- gamma radiation levels
  - temperature
  - barometric pressure
  - relative humidity
  - wind speed and direction
- 

**Comparability** Comparability is a measure of the confidence with which one data set can be compared to another.

Comparability of the NEWNET data is ensured because of the use of the same equipment, processes, and analytical methods at several station locations.

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**Completeness** Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under correct, normal conditions.

Data may be lost due to equipment malfunction, power failure, station destruction, human error, or unacceptable data uncertainty.

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**Precision** Precision is a measure of mutual agreement among individual measurements of the same property, usually under prescribed conditions, expressed generally in terms of the standard deviation. It refers to the variability that occurs if the same readings were performed again at the same location and at the same time with no change in conditions, or the degree to which repeated measurements on the same measurement agree. Results of duplicate measurements provide an estimate of instrument precision.

Instead of providing separate precision specifications, the NEWNET project has specified combined accuracy and precision for the measurements (see below).

## Quality Objectives and Criteria for Measurement Data, continued

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### **Accuracy**

Accuracy is the degree of agreement of a measured value with the true or expected value of the quantity of concern.

The NEWNET system is currently operated so that the measurements have the following precision and accuracy:

- Gamma radiation:  $\pm 5\%$  precision,  $\pm 60\%$  accuracy from 0.07 to 0.3 MeV and  $\pm 20\%$  from 0.3 to 8 MeV.
- Temperature:  $\pm 5$  degrees Celsius
- Atmospheric Pressure: 1%
- Wind Speed:  $\pm 1.0$  mph
- Wind direction:  $\pm 10$  degrees
- Relative Humidity:  $\pm 10\%$  at 25 degrees Celsius

## Station Design

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### Sampling system design

The primary design objective for the radiation monitoring system is to provide accurate measurements of gamma radiation levels around the station locations. To achieve the objective, the system design is based on standard instrumentation for real-time gamma radiation.

All NEWNET stations are operated continuously. The stations contain a high pressure ion chamber (HPIC) to measure gamma radiation and meteorology instruments to measure selected meteorological parameters.

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### Station location selection rationale

Locations for the NEWNET stations (listed in Appendix B, *NEWNET Station Locations*) were selected at the request of other organizations. Locations are evaluated regularly and the locations are subject to change.

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### Sampling frequencies

The data logger accumulates data at one minute intervals which are then averaged for 15 minutes.

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### Measurement parameters

The following parameters may be measured, all averaged every 15 minutes:

- gamma radiation
  - temperature
  - pressure
  - humidity
  - wind speed and direction
- 

### Station siting evaluation criteria

The specific location of the station should be selected after considering the following criteria.

1. **Distance to obstructions (primarily buildings) greater than two times the height of the obstruction:** If possible, the distance between the station and the obstruction should be at least two times the height of the obstruction. This criterion contributes to unrestricted air flow for meteorological measurements.

## Station Design, continued

2. **Good topographic location:** The area site should be as level and flat as possible. This will provide a stable foundation for the station.
3. **Obstructions:** Obstructions between the source and the station are minimized.
4. **Sources of radiation:** The station is isolated from anomalous sources of radiation. A radiation survey should be performed covering the proximity to ensure that the site chosen does not have a significantly different natural background exposure rate than nearby areas. Man-made sources of radiation should also be considered.
5. **Grounding:** Consider electrical grounding and lightning protection, especially if the station includes a 10-meter-high pole; stations that do not include a 10-meter-high pole and that are only powered by solar collectors and 12-V batteries do not have to be grounded.

These criteria are important to ensure consistency and adequacy among station locations. Good scientific judgment will be used to select the optimal location based on site-specific criteria and on specific measurement needs. However, not all sites can meet all these criteria. In some cases, a station may be sited close to a building. In this case, it may not be appropriate to include meteorological instrumentation on the station.

### NEWNET station equipment

A NEWNET station typically consists of a HPIC, temperature sensor, pressure sensor, humidity sensor, and wind speed and direction sensors. Equipment have the following specifications:

Parameter	Instrumentation	Specifications
Gamma Radiation	Gamma radiation is measured by a Reuter-Stokes High Pressure Ionization Chamber, model RSS-100 (RSS-1013 system includes the electronics, display and Model 100 PIC); Model 120 on portables. This instrument has an ionization chamber filled with argon to a pressure of 25 atmospheres (about 450 psi). Reuter-Stokes is a subsidiary of General Electric.	Range: 0-100 mR  Precision: $\pm 5\%$  Accuracy: $\pm 60\%$ at 0.07 to 0.3 MeV, $\pm 20\%$ at 0.3 to 8 MeV Ionization chamber volume: 7.9 liters  Energy response: 0.07 to 8 MeV

## Station Design, continued

Parameter	Instrumentation	Specifications
Temperature	Temperature is measured by a Met One model 064-2 temperature sensor mounted in a Model 075 or 5980 solar shield to reflect solar radiation.	Range: -50 to +50° C
Humidity	Humidity is measured with Rotronic Hygromer™, model 200 series.	Humidity Range: 0-100% RH  Precision at 68-77° F: ± 10%  Temperature limits at sensor: -5 to 212° F (-20 to 100° C)
Barometric Pressure	Barometric pressure is measured by a Met One Barometric Pressure Sensor Model 090D. This is available in a number of calibration ranges, determined by the elevation of the station.  Barometric pressure decreases by about 1" Hg per 1000 ft of elevation. The value is converted to millibars of barometric pressure, and is reported unadjusted for elevation. (Values normally reported in weather reports have been adjusted to pressure at sea level.)	Calibration Range (standard model): 26-32" Hg at 0-1500 feet (elevation)  Accuracy: ± 1%  Operating temperature range: -22 to 50° C



## Station Design, continued

Parameter	Instrumentation	Specifications
Wind	Wind data is measured by Met One Model 6266/037 System, consisting of a wind speed sensor (anemometer cup) and wind direction sensor (vane).	Range:0-100 mph; 0-360 degrees Threshold: 1.0 mph, speed and direction indicators Accuracy:±1.0 mph; ±10 degrees Distance Constant: <5 feet (speed<;1.5 feet (direction) Damping Ratio:0.25 (direction) Temperature Range: -50 to +85° (speed); -50 to 70° C (direction)
Main power batteries	12V GNB Sunlyte 5000X	100 AH lead-acid
HPIC battery	300V lithium pack	55mAH lithium
Data logger	Synergetics	
Satellite transmission equipment	GOES 10W and 40W (portable) transmitters; Crossed YAGI antenna	

### Duplicate sampling and analysis

The NEWNET project maintains a supply of back-up sensors. These sensors may be placed in the field when existing sensors are found to be malfunctioning. These side-by-side measurements can be used to identify the source of measurement problems.

## Instrumentation and Equipment Testing, Inspection, and Maintenance

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<b>Preventive maintenance of the stations</b>	Operation and maintenance of the field equipment is the responsibility of personnel assigned to perform this work by the Community Monitoring Project Leader.
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Station managers are asked to routinely inspect NEWNET data for their stations on the web and at the station to identify problems. The station managers may work together with the NEWNET staff to identify and correct instrumentation problems.

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<b>Preventive maintenance of the meteorological sensors</b>	Sensors should be replaced with pre-calibrated and tested units as available. Units should be calibrated and refurbished at the shop or by the manufacturer.
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<b>Operational checks of the HPICs</b>	The HPICs should be calibrated on an annual basis.
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<b>Battery tests</b>	<p>The 12V spill-proof batteries will be load-tested upon receipt and prior to installation.</p> <p>The 300V HPIC batteries should be replaced when the voltage drops below 285 volts.</p>
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<b>Tower hardware</b>	The tower and grounding equipment should be inspected once per year.
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## Instrument Calibration and Frequency

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**Calibration of HPICs** On an annual basis, the HPICs should be calibrated using procedure MAQ-248 (“Calibration of the PIC on NEWNET Stations”). This calibration procedure will also be performed any time the HPICs have required repair.

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**Meteorological instrument calibration** The instruments for measuring atmospheric relative humidity, barometric pressure, wind speed and direction, and temperature should be calibrated by their manufacturer or as specified in procedure MAQ-402 (“Calibration & Maintenance of Instruments for the Meteorology Monitoring Program”).

## Data Management

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### Data transfer and management

The data taken by the NEWNET station are currently stored in a database on the DBSRV2.LANL.GOV computer. The database sends data to the Web servers where it is available to the public ([newnet.lanl.gov](http://newnet.lanl.gov)).

A description of the data management system is presented in the “NEWNET Database Software System General Documentation” (Sofaly et al, 2001). The documentation includes a description of the hardware systems, database structure, system administration procedures, and web page design/operation.

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### Data security

NEWNET data are recorded automatically and are not altered by human intervention. However, the data are checked periodically, and any station that is malfunctioning to the extent that the data are likely to be misleading will be shut down or removed from the web until the problem is corrected.

The NEWNET computers are on the LANL "Green" network and therefore must be protected from unauthorized access or "hacking". All NEWNET computers on the Green network will be protected by a security program to prevent unauthorized access.

## Data Review, Validation, and Verification

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### Data review process

NEWNET data are reviewed by the NEWNET project personnel. NEWNET data are not specifically qualified or rejected in the database. Missing data are not reconstructed or estimated.

If instrumentation errors are identified in the detailed data quality review, the station manager is notified.

Station managers also periodically review the data from their station. Their comments and observations are called in or e-mailed to the NEWNET project personnel for follow-up.

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### Parameters reviewed and evaluation criteria

The quality of the NEWNET data transmission, meteorological data, and gamma radiation data are reviewed. NEWNET personnel develop a preliminary report indicating the presence of data problems. This report is circulated to other NEWNET personnel and the instrumentation technicians.

#### Meteorological data:

The meteorological data are evaluated against standard ranges in the preliminary data review.

#### Gamma radiation data:

Gamma radiation data are reviewed to identify elevated readings. These may be produced by LANL operations, weather conditions, or instrument/transmission errors/noise. When elevated readings are observed in the detailed data quality review, the NEWNET staff member investigates possible LANL sources or weather phenomenon. If the elevated readings cannot be attributed to these items, the NEWNET instrument technicians are notified to investigate instrument error or noise.

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### Handling of outliers

Outliers remain in the database; they are not removed from the database or web presentation.

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### Calculation of summary statistics

Summary statistics for each site are calculated as needed. The elements of the summary record may consist of:

- annual run time for the station
- annual completeness of the data by individual parameter.

## Data Review, Validation, and Verification, continued

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<b>Calculation of gamma radiation averages</b>	On the web site, for each station, gamma statistics are calculated for the period requested by user. This includes the minimum, maximum, average, standard deviation for the time period selected. In addition, the total exposure is calculated for the period.
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## Reconciliation with Data Quality Objectives

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**Calculating  
data  
completeness**

For all stations, data completeness is calculated as follows:

- Run time of each station: the total number of 15 minute sampling periods for each station divided by the total number of 15 minute periods in the time period being evaluated.
- Data completeness: number of results obtained for each parameter at a station divided by the total number of possible data points (adjusting for stations that were established for only part of the year) in a calendar year.

These data may be compared to the completeness criteria described in Section A7 of the AIRNET QAPP: 95% for FFCA compliance stations and 90% for others.

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**Failure to  
meet specified  
DQOs**

When differences are identified between specified and measured values for completeness, a deficiency report will be generated (MAQ-026), and the causes of the differences will be investigated, reported to management, and corrected where possible.

## ***Section 6***

### **Design**

#### **Design**

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**Identify  
design  
requirements**

The NEWNET project requires no hardware design activity.



## ***Section 7***

### **Procurement**

#### **Procurement**

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**Procurement  
of items and  
services**

Procurement of items and services used in the NEWNET project will follow the Laboratory procurement process and the requirements in the MAQ-QMP. Most items and services required for the project are commercial grade in nature and no special procurement requirements or needs are necessary. For items and all services for which special requirements are necessary, the Project Leader and project members will identify such items or services.

## ***Section 8***

### **Inspection and Acceptance Testing**

#### **Inspection and Acceptance Testing**

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**Policy**

Any materials or services will be inspected and/or tested prior to acceptance for use in the NEWNET Project. Most supplies used during performance of NEWNET activities are commercial grade in nature and require no special acceptance practices or procedures.

## ***Section 9***

### **Management Assessment**

#### **Project Management Assessments**

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**Internal  
assessments**

The Air Quality Group conducts internal management assessments of all projects and programs in the group in accordance with requirements in the MAQ Quality Management Plan. Assessments of the project are documented and filed as records.

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**Responding to  
assessments**

When violations of requirements are found during a management assessment, a deficiency report is initiated to document the violation. Corrective actions are tracked and documented in accordance with MAQ-026, "Deficiency Reporting and Correcting."

## ***Section 10***

### **Independent Assessment**

#### **Project Assessments**

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**Policy**

Independent assessments are those assessments conducted by organizations external to MAQ. As required by the MAQ QMP, NEWNET may be assessed by outside organizations.

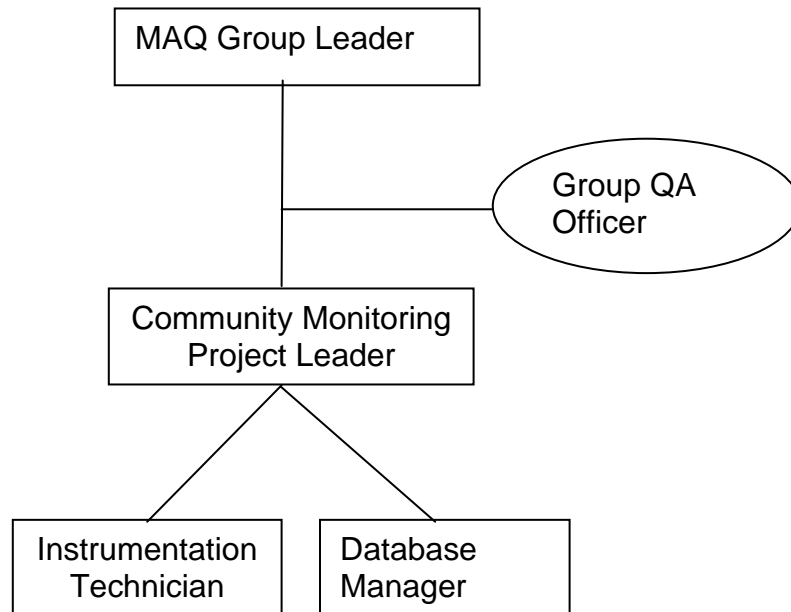
In addition to these assessments, the NEWNET Project will also be subject to additional audits/assessments as required by LANL policy and/or the group leader.

The Community Monitoring project leader (in coordination with the group QA officer) will ensure that all required assessments are conducted.

[Click here to record “self-study” training to this procedure.](#)

## ***Appendix A***

### **NEWNET Project Organization**





## ***Appendix B***

### **NEWNET Station Locations**

The following stations are in place on the date of this plan. For a current list, contact the Community Monitoring Project Leader.

<b>Station Name</b>	<b>Location</b>
KAPPA site	TA-18, east ridge.
Ohkay Owingeh	Ohkay Owingeh School grounds, SE corner of playground.
San Ildefonso	San Ildefonso, between judges chambers and fire station.
LA High School	Front lawn, parallel with Diamond Dr.
East Gate	~500' ESE of East Gate guard tower, located in building on canyon rim.
Buey East	Canada Del Buey canyon, ~ 1 mile west up canyon from Met Tower.
Met Tower	1/8 mile from Pajarito road entrance to Canada Del Buey.
TA 54 Area G south	South end of Area G, west of TWISP facilities.
TA-54 Area G test	Area G, ~ 50' west of TA54 G South station.
TA-54 Area G entrance	Offices near the entrance gate to Area G
DP West	DP road, ~300' west of TA21.
S-Site	TA16 entrance.
Cochiti	In Cochiti Pueblo, ~1/4 mile south of baseball fields on west side of road.
Espanola	NNMCC, setting on lawn adjacent to gymnasium.
SF School for the Deaf	Orchard, off St Francis Drive.
Santa Clara (Puye)	West on Puye Cliffs road to the Arts and Crafts area, ~ 600' N of roadway.
TA54, NE Corner	Outside fenced area of AreaG, NE corner of TWISP area, ~ 40' N of air sampler station.
Mortandad Canyon	Next to meteorological station south of LANSCE





## ***Appendix C***

### **References**

#### Requirements and guidance documents:

DOE Order 5400.5, "Radiation Protection of the Public and the Environment," changed January 7, 1993

LANL Performance Requirement LPR 308-00-00, "Institutional Quality Management"

DOE/EH-0173T, "Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance," January 1991

#### Group MAQ Air Quality documents:

MAQ-QMP, "Quality Management Plan for the Meteorology and Air Quality Group"

MAQ-MET, "Quality Assurance Project Plan for the Meteorology Monitoring Project"

MAQ-022, "Preparation, Review, and Approval of Procedures"

MAQ-024, "Personnel Training"

MAQ-025, "Records Management"

MAQ-026, "Deficiency Reporting and Correcting"

MAQ-029, "Management Assessments"

MAQ-030, "Document Distribution"

MAQ-032, "Orienting New Employees"

MAQ-248, "Calibration of the PIC on NEWNET Stations"

MAQ-402, "Calibration & Maintenance of Instruments for the Meteorology Monitoring Program"

#### Other references:

"NEWNET Database Software System General Documentation", version 4.0, prepared by Karla Sofaly, Clayton Watson, and Mike McNaughton, February 2001.